ABSTRACT
The following paper examines the potential for growth achieved through a maritime cluster in Puerto Rico. Given the development stage of the Port of the Americas, many issues must still be resolved before successful operations can be achieved. Pitfalls and opportunities are examined using similar clusters and alternative governance options. Recommendations for successful development of the Port of the Americas are discussed.

Classification: Economic Development, Regional

Keywords: Development, maritime cluster, port, regional

Introduction
The importance of clusters in economic models has been growing since the 1990’s. This “new” model was initially focused on the way we perceived locations for the establishment of industries. As logistic questions arise, the roles of the government and the roles of the institutions, along with a unique set of competitive advantages create the scenario for the examination of the cluster. Clusters around the world have been identified and studied by academics, economists and politicians. The findings of these studies are as diverse as the clusters themselves.

Clusters are geographic concentrations of interconnected companies and institutions in a particular field Porter (1998). In the ports industry, as in any cluster, we have to assume organizations operating around its economic activities are mutually dependent. They are “glued” by complementary formal and informal relations. Clusters can arise from many circumstances. They can arise due to the strategic location of the organizations, necessities of the area, suppliers’ presence, environmental needs, innovative companies or merely by the chance of some event. If companies look in the direction of clusters, it is better to consciously invest in elements related to the cluster formation and look for a common goal.

An organized structure that supports the long term goal is necessary to bear the fruits of the cluster performance. In our case study, the organizations around the Port of the Americas are supporting the efforts of the government which will result in the future economic growth of the port as a regional cluster. Regionalization is lead by specialization and it opens the cluster to related industries. Considering the efforts of the government of Puerto Rico, focus should be placed on the industries that provide the highest benefit and will be those industries located in the region of the Port of the Americas; the area to be developed. Data about specific industries is displayed in upcoming sections.

The Port of the Americas is a project sponsored by the government of Puerto Rico and has various objectives: relieve the over demand for cargo services at the Port of San Juan, improve the economic conditions of the Southern part of the Island, and open new markets for Puerto Rico and the Caribbean region. In our discussion case of
the Port of Las Américas, we are identifying the services and industries that complement each other. There is a general need in Puerto Rico to learn from similar cluster examples around the world. The actual business strategy is for companies to look for innovative and efficient ways to deal with suppliers. The decision of choosing distant suppliers could stumble on inefficiencies and this provides an opportunity where a port cluster can capitalize.

As the cluster theme evolves, different variables like the cluster governance have been increasing in importance. Is our intention to study the governance variable importance from the cluster perspective by referring to the case of the Lower Mississippi Port Cluster (LMPC) and in the light of the findings in this study, we will evaluate the needs of the developing Port of Las Américas as a cluster in Southern part of Puerto Rico.

The Ports Industry

The movement of cargo through the maritime ports can be viewed as; elements of a good, a value on a chain of value or a logistic component. The value chain is a mix of production, consumption, distribution and exchange of activities. These activities involve the acquisition of the raw materials through the sale of the finished good Porter (1998). Adding value and reducing costs on each step of the chain is a major concern.

Maritime port development depends on technological, geographical and economic factors. The development of regional ports, specifically, has resulted in merchandise traffic growth and industries establishment. The port generates commercial exchange activities that lead to the development of industrial parks related to a common market, industry or hinterland. As other infrastructure projects, the port is used as a tool for attracting economic activity and encourage the clustering process. A maritime port is a logistics center characterized by activities and functions directly and indirectly related to the transport process and information transfer (Notteboom).

All ports go through a series of stages after starting operations. These stages are expansion, specialization and regionalization. Investment on these assets is long term oriented and the ports need to develop economic activity around the region if they want to compete internationally. This broad development of the port must be matched with the local objectives, the operation model, the local traffic, the international traffic and the regional competition. The hinterland will be affected by all the mentioned factors. Regionalization expands the hinterland integrating the markets and strategies of distribution centers of the port region. The region’s total integration is the result of the positive relation with the level of development of the systems within the port.

Regionalization and Value Added

The evolution of a port begins with the establishment of the installations, preferably near a city. Once the cargo starts to arrive, different activities and merchandise categories produce a port operation. These operations expand the range of services through the port facilities to the regionalization stage. The expansion of the facilities occurs with the infrastructure investment in order to fulfill the increasing needs of the market.

1 Hinterland is the land behind the borders of a coast or river. It’s the inland region lying behind a port. It’s the area from which products are delivered to a port for shipping elsewhere.
demand for services. Links have to be created between the port, the private industries and the city. Different kinds of merchandise will lead different developments through the value added of the received products. The areas around the port will increase their value making available more land for development of facilities. The establishment of leader firms on these new facilities adds interest in the value chain of the products been transferred or processed through the port. The access to core forelands\textsuperscript{2} develops competitive advantages and value added for the products. As a consequence of the captured value for the port, the measurement of the value added services becomes an important aspect of evaluation.

**Cluster Development Objectives**

Not only the maritime cluster, but also cluster objectives in general hunt for development. Cluster initiatives promote investment in knowledge and technological development. Also, they lead to the specialization and strengthen of companies’ core competences. In terms of the population, they increase the development of knowledge and abilities of the labor force. The objective of the cluster suggests that it is better to move groups of linked activities to the same place than to spread them across numerous locations Porter (2003).

The cluster development process is created on three phases; initiation, early growth and dynamic growth (Bradac). The initiation phase is characterized by a common vision. The early growth phase is characterized by the implementation of an action plan. The third phase results from building the infrastructure in the second phase. As the managers of the Port’s Authority, the government of Puerto Rico must assume its catalyst role in the overall process. Mainly, the government must remove barriers which can limit the growth of the cluster and provide the industry with the necessary knowledge and skills to compete and thrive.

**Port of Las Américas Cluster Structure**

A cluster is a set of geographically concentrated institutions (public and private) which are related to a business. Some studies make bold, clusters is a population not an entity P. W. De Langen (2006). The institutions identified as part of the cluster must be related directly to the economic core activity. To be considered part of the cluster, private businesses, which include suppliers, manufacturers and logistic partners, must devote a majority of their business to the specialization of the cluster. In the case of the Port of Las Américas in Puerto Rico, the government has identified target value added industries outside of the Island. These target industries must be persuaded by local support in their respective fields.

Since 1998 the government of Puerto Rico has worked on the idea of developing the Port of Ponce, which is a secondary port in the south of the Island. The southern region of Puerto Rico was an important trade and commercial point in past decades, but now it is in need of a new economic engine. The investment required to transform the Port of Ponce to a large scale transshipment port that will be known as The Port of Las Américas, could be this engine.

The industries located in the city of Ponce and the surrounding municipalities are diverse. Databases have identified operating industries in the region and officers of Puerto Rico Industrial Authority, the government of Puerto Rico must assume its catalyst role in the overall process. Mainly, the government must remove barriers which can limit the growth of the cluster and provide the industry with the necessary knowledge and skills to compete and thrive.

\textsuperscript{2} Foreland is the final destination of transshipped merchandise or the ending market for the product.
Development Corporation (PRIDCO) and other government agencies have publicly revealed which industries have been targeted for future development as a direct impact of the port’s development.

Table 1 below, compares the government’s identified target industries and the existing industries in the southern region. This comparison allows us to analyze, from a clustering perspective, the efficacy of the government on attracting this kind of industries. For the most part, the industries identified by the authorities have some sort of presence within the southern region. There are other industries which were not included in this initial movement that can potentially grow as a result of the development stages of the Port. Some of these industries are petroleum and minerals, electronic manufacturing, wood products, and printing services. From a social perspective, we can find two reasons for this; these companies are already well established and their operations will follow the development or these industries are not targeted because they will not generate a significant amount of jobs.

Table 1

<table>
<thead>
<tr>
<th>Industry</th>
<th>Government Target</th>
<th>Existing Industries</th>
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<tbody>
<tr>
<td>Food Processing</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Contract Manufacturing</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Medical Equipment Ensemble</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Recycling of Plastic Products</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Steel Mini Mill</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Logistic Services</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Automotive Industry</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Cosmetics</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Return Merchandise Processing</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Petroleum and Minerals</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Printing services</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Electronic Manufacturing</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Wood Products</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Data obtained from: Tercer Simposio del Puerto de Las Américas, (Vargas) and ¿Cuáles son las industrias que crearán valor añadido en la zona sur de Puerto Rico como resultado de las operaciones del Puerto de las Américas? (Vicéns Feliberty).

It is important for the government of Puerto Rico, its institutions, and the Port of Las Américas authority to be cognizant of the changing role of the modern economy. Smokestack chasing, based on industrial policies of tax incentives, subsidies or restrictions do not reinforce development of all clusters. Promising industries like automotive (assembling) and cosmetics have no actual presence in the Island, but represent job opportunities for the zone. The main concern should be to attract these industries and allow them to grow as a cluster generating interconnected relationships with local suppliers and synergies which will create economic potential. The investment in the Port’s infrastructure should be justified not as an industrial park or zone in which companies enter and exit like their product cycles, but
as a cluster that will bring innovation and permanence to the zone.

Through literature reviews, we have identified four structural factors that influence the performance of a cluster: agglomeration economies, internal competition, entry and exit barriers and heterogeneity of the cluster population. Other factors affecting the performance of the cluster are government policies, involvement and industry growth expectations. The Port’s cluster in the south of Puerto Rico is not developed enough to measure the structural factors in their totality. The comparison in this document is focused on the cluster’s governance factor and the necessary characteristics for a successful development.

The definition of cluster governance is the mix of and relations between various mechanisms of coordination used in a cluster P. W. De Langen (2004). In several studies, like De Langen’s, the focus on the quality of the governance in the cluster is an important factor for success. There are four variables on the quality of the cluster governance: trust, intermediaries, leader firms and solutions to collective action problems (CAP). The CAP includes infrastructure problems, the role of public organizations and any issues with the community and the leader firms. The solutions to CAP deal with the quality of the administration, which implies pulling cluster governance in one direction. Each organization; private, public or association has their own role in the collective voice of the cluster. All of them must be willing to find solutions to the common problems.

Cluster governance is the variable that mixes the relations of the parts involved. Different institutions with different behaviors need a focal point in which they can agree in order to establish a healthy relationship for the common prosperity. Trust on the main cluster activity, the presence of intermediaries, and the presence of a leader firm are important variables. In the case of the Port of the Américas the leader firm, at this moment, is the government of Puerto Rico, which is leading the investment and the efforts to unify the region.

As mentioned before, another variable is the solution to collective problems resulting from the mutual interests of the parts. The associations, institutions, universities, and businesses all part of the industry, must act in the better interest of their members and stick to the collective commitment of the community’s development. All public institutions also play an important role on the supporting environment that must exist for the growth of the cluster. In addition, the academy is included in this group of supporting institutions, doing its part through research, investigation and measuring and evaluating the development of the area.

Governance in Seaport Clusters

In a port’s development, all companies that surround the area enjoy the benefits of its fully competitive services. This is what we call a synergistic relationship within the parts. The industry of merchandise transportation is a very competitive one due to the existing routes of the ships. The Ports authorities compete internationally for the use of their facilities. It is complicated to change or attract freightliners, maritime lines and investors to new routes, since factors such as founding, economy, location, services and stability are important determinants. In order to gain access to these value chains, the parts as a collective must pull the movement and attract the attention of the big players.
Sometimes, this is called internationalization (P. W. De Langen, Ensuring Hinterland Access; The Role of Port Authorities). Internationalization involves marketing, promotion and networking.

Port’s authorities look for partners to co-invest in the improvements of the hinterland to be able to compete internationally and find solutions to collective problems in the cluster. A common structure for these purposes is the public-private association of management for the assets of the port. A port authority is important to the cluster formation and maintenance. Port authorities can be managed by the state, nationally, regionally or municipally. The management of the authority impacts the level of investments, the interest in the project and the administration of funds. Some managing arrangements can be detrimental to the objectives of the cluster. For example, national port authorities can deter investments due to the distribution of funds and private port authorities can ignore necessary investments on infrastructure due to the cost-benefit justification. On the contrary, regional port authorities know the needs of the tenants and the cluster. They distribute the funds and justify the investment based on the benefits for the sum of the parts, not on a profit-driven environment for the individual industries. This has been precisely one of the problems for the Port of the Américas’ development: central power of the Port’s authority and funds are managed by the state and not by the region. All relevant decisions should be made by people whom are aware of the needs of the city in which the Port’s been developed. In addition, political influences and public pressures have made the process more difficult.

The Port’s authorities need to focus actions into the cluster operations, which is based and tied to the seaport operations, and not on the facilities of the terminal. The main focus of the authorities should be to claim collective benefits for all the companies in the cluster, not to foster private profit operations. Port authorities are public in essence and governments support their infrastructure through investments in the pursuit of the collective well-being. Some examples of these investments in collective benefits are highways, water processing plants, bridges and other infrastructure projects. The project operates as a nonprofit corporation in the majority of the cases, including the case under study of the Port of Las Américas. Like other public services, the cost incurred does not necessarily match the benefits for the tenants. The investment is justified by the benefits for the population. In the end, the port charges for its services to the ships, cargo owners and other users based on their use not on the cost of the total investment.

**The Port of Las Américas and Puerto Rico**

As we focus on the governance of the cluster, the Port’s authorities have an important role as the managing entity. All investments made by these entities must be identified and summarized in order to find specific determinants of growth. In this section we summarize the types of investments realized by The Port of the Américas authority and relate them to the socioeconomic characteristics of Puerto Rico.

During the first phase of the Port of the Américas there were lots of funds invested on the dredging of the bay. The Port of the Américas consists of 1,200 feet (365.76 meters) of newly built harbor with
100 rail gauge (30.48 meters) designed for super post panamax cranes, 50 feet (15.24 meters) depth berths, and a newly built yard with an annual capacity for 250,000 TEU’s\(^3\) (Authority of Port of Las Américas). The proposed plans of the government of Puerto Rico are to expand the facilities to 4,400 feet (1.34 linear meters) of quayside and yard storage for 1.4 million TEU’s in the next years. A total of 1,225 acres of available land for development has been identified for heavy and light industrial uses (Authority of Port of Las Américas). The warehousing facilities, distribution zones and cargo handling facilities are available in the immediate surroundings of the Port of Las Américas.

Land for future development is already identified in the zoning plan of the city of Ponce. The government of Puerto Rico possesses updated information about land availability in the immediate surroundings of the port area Vargas (2008). The Port Authority by now own one fix quay and one movable quay and has invested in the acquisition of eight movable quays for the expected cargo volume. The port does not have rail services for the transportation of merchandise. Transportation is provided by carriers and barge services are available in Ponce and other southern ports.

Puerto Rico, as a hinterland, provides very distinctive characteristics for the Caribbean region. As a market for maritime and economic purposes is a growing target. The Island represents a big market with an increasing GDP since 1999, which reached the amount of 60,787 millions in 2008. As showed in the Graph 1, the mayor component of GDP is the personal consumption, followed by the domestic investment and the government consumption. The Island maintains a net sales deficit with the rest of the World since 1999, which has shown recent growth.

\(^3\) Twenty four equivalent units’ containers.
Puerto Rico is an attractive target market for the retailing industry due to the increasing personal consumption. At a constant price (1954) Graph 1 shows continuous growth in that component of the GDP. The major expenditures included in the Personal Consumption Expenditures Index (shown in Graph 2) are housing, medical and funeral services, clothing and accessories, food, personal care, recreation, and foreign travel. Also, we can see a decrease in recent years in the sectors of transportation, business services, alcoholic beverages and tobacco, and miscellaneous purchases.

According to available statistics for year 2008 (Graph 3) personal income has increased during the past 10 years, reaching a top of 56,201 million dollars. Disposable personal income and net national income has risen. The gross fixed domestic investment has slightly decreased.
Total employment in Puerto Rico had increased until 2007, 2008 shows a decrease in this sector according to Graph 4. The Composition of the employment sector in Puerto Rico, as showed in Graph 5, presents the service sector as the biggest employer, followed by the government in second place and the trade industry in third. The retail industry and the manufacturing industry are in fourth and fifth place, respectively.

Source: Puerto Rico Planning Board, Program of Economic and Subprogram of Economic Analysis
The imports market in Puerto Rico shows an increasing trend of millions of dollars, although it slightly decreased during year 2008 (Graph 6). The highly imported products as showed in Graph 7 are manufacturing, chemical, pharmaceutical and medicines, petroleum, computer and electronics, motor vehicles, and transportation equipment.
Construction has always been an important indicator of the economy’s health but as demonstrated in Graph 8, it shows a decreasing trend during last 10 years. All expenditures in the private, public and governmental sectors have decreased.

There are several factors which can be used to explain the level of success of some ports and maritime clusters. Since Puerto Rico has similar characteristics to some ports in the United States we refer to the study prepared by Peter W de Langen.
and Evert-Jan Visser (2005), the Lower Mississippi’s port development, to bring some direction to the Port of Las Américas, on cluster governance.

**Lower Mississippi Port Cluster (LMPC)**

The maritime cluster itself does not guarantee immediate economic results. Five important collective action problems exist in seaports; training and education, innovation, marketing and promotion, hinterland access and internationalization P. W. De Langen et al (2005). The studies like the one realized in the Lower Mississippi Port Cluster (LMPC), reveals the importance of collective actions for the seaport cluster success.

A port cluster operation consists of all economic activities of public and private organizations related to the arrival of ships and cargo in ports. Cargo handling, transport, logistics, manufacturing and trade activities are included in the port cluster Chouly and De Langen (2004). The Lower Mississippi Port Cluster is administered by five port authorities, which act as the clusters managers. These political subdivisions of the state of Louisiana, have been investing on infrastructure, but leaving out factors that affect the quality of the cluster itself. As managers of the cluster, the port authority must aim to insert collective action regimes which serve as the glue for the operations development.

The port activity is commonly measured by the amount of cargo received in the terminals. According to new studies, this is not the most effective way to measure the economic activity in a port. Since, different cargo can lead to different developments in the surrounding port’s area Vicéns Feliberty (2008), value added measures are more effective in measuring the performance of the port cluster. The LMPC shows signs of having lost their cargo handling ability according to P. W. De Langen (2004).

Most of the ports focus on infrastructure and transportation variables in order to justify multimillion dollar investments. Value added performance, when measured, can change the priorities and the emphasis of investments to other qualitative factors. Such factors can be defined as an educated labor force, a set of educational institutions, technology and a well developed hinterland. The managing role of the port’s authority is to promote the improvement of the cluster. And the role of the leader firm is one that leads to innovation in the cluster. If there are just subsidiaries; innovation is not promoted because of the lack of authority. The absence of leader firms negatively influences the modernization of the hinterland facilities and infrastructure. Like in a chain reaction, the lack of enough market or cargo movement will not justify the creation of railroads, roads or transportation methods for the trade of the different kinds of merchandise.

Collective action regimes results from the desire of partnerships for joint initiatives to solve collective action problems. Collective action regimes are influenced by: leader firms, public organizations, organizational infrastructure, community arguments and individual firm’s voice. These variables affect the performance and the quality of the cluster. In the case of the LMPC, De Langen found lack of leader firms, weak public actors, individual port authority actions and no structural involvement of private firms. LMPC is an example of a high traffic port, with poor cluster governance and weak collective regimes P. W. De Langen (2004). For an established port, like LMPC, the
authority governance should be focused on increasing the presence of strategic partnerships, the levels of trust, funds for investments and the attraction of leader firms.

In accordance with the evaluation of the Port of Las Américas development, information and statistics about ports in Europe and United States are very useful to understand which factors should be considered first by the government of Puerto Rico. Some studies, like De Langen’s, have measured the importance of cluster performance variables. Structural factors are not available for comparison in the southern region of Puerto Rico. The governance of the cluster is the aspect that shows to have the largest impact on the operations and development of the cluster. The governance measures like; cluster structure, general economic climate, cluster governance and national and international policies can be identified and can be improved at this stage of the Port of Las Américas. The implementation of actions from the port authority, the involvement of private firms and the connection with public actors in combination with the governmental investment on infrastructure can set the bases for a stronger cluster structure in Puerto Rico.

Conclusions and Recommendations

Regional Ports appear to be more efficient in the management of the cluster governance variables. Puerto Rico has the advantage of having one central management port authority (versus five in Lower Mississippi Port Cluster). The Port of Las Américas is a state managed authority which, from a local perspective, creates problems of trust and capacity for the solution of collective problems. Some variables like the attraction of leader firms and intermediary’s management seem to be well controlled by the Port of Las Américas authority. The cluster governance of the Port of Las Américas is in an early stage due to the limited operations. Once it starts to operate and to generate economic activity it must be organized from a regional perspective in order to increase the trust in its capacity to solve the collective problems.

The Port of Las Américas authority and the government of Puerto Rico are targeting industries with presence in the southern region. Some industries like logistic services, food processing, contract manufacturing and medical equipment assembling have potential to increase liaisons with the maritime cluster. Other industries such as petroleum and minerals, electronic manufacturing and wood products are left behind by the promotional efforts. The targeted industries represent a market of value added services provided by a highly skilled labor force.

The government of Puerto Rico bet to the quality of the labor force and the presence of international firms in different industries, result of the dynamic economy. These will provide innovation platforms to new firms. There are resources and incentives available for training, recruiting and development for industries requiring special types of labor force which will result in value added to their products. The Universities in the southern part of the Island must focus specifically on the logistics and maritime industry in order to increase a competitive advantage to the Port. The involvement of the different sectors is essential for the unity of the cluster governance and the solution to the collective action problems.

According to studies realized by the government of Puerto Rico, the most important indicators for investors in the Port
of Las Américas are: the local market, gross national income per capita, labor force pool, port specifications, macro political conditions, and economic and financial risks. For the investors the local market factor (hinterland) is a strong factor. The GNI per capita, the market size and the population are as attractive as the labor force pool. The port specifications, like terminal area, depth, warehousing facilities and the presence of a foreign trade zone are a capstone for attracting the private investment. The macro political, economic and financial risks and micro business risks appeared to be less influential factors.

The case of the LMPC allows us to understand that in Puerto Rico the qualitative factors of the market may prove to be attractive. This means that Puerto Rico’s government efforts need to be focused on these qualitative factors to attract and retain major investors. The creation of the maritime cluster needs value added activities that can’t be realized in other Caribbean ports, in order to create the network of interconnected industries. Also, it is necessary to establish the governance factors in order to include all the participants, associations, investors and stockholders in general, in the process. Far away from the structural factors, the governance variables; trust, intermediaries, leader firms and solution to collective action problems, are the aspects which will determine the success of the value added activities attraction and the development of the maritime cluster. To be successful, the Port of Las Américas must be a collective effort, not an individual achievement.

References


